Why a Theater Sensor Signals When Wet

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A theater class models a water sensor with two contacts separated by a small gap. The sensor signals when charge moves through material spanning the gap. A copper strip gives a signal. A clean gap gives no signal when dry or when covered with deionized water.

1 The copper strip produces a signal without dissolving. Explain what moves charge through solid copper. [1]

Answer and work

Two new marks each span the gap. One mark is a graphite trace that remains attached when rinsed. The other is a deposit of potassium chloride that can be rinsed away with deionized water. The class measures each mark when dry, when wet with deionized water, and again after rinsing and drying.

Mark	**Dry**	**Wet**	**After rinsing and drying**
X	Signal	Signal	Signal
Y	No signal	Signal	No signal

2 Which identification fits the complete set of observations?

(1) X is potassium chloride and Y is graphite.

(2) Both marks are graphite.

(3) X is graphite and Y is potassium chloride.

(4) The observations cannot distinguish the two marks.

3 Both wet marks produce the same signal. Explain how the two wet marks can carry charge using different kinds of particles. [1]

Answer and work

4 After rinsing and drying, mark Y gives no signal. A student concludes that the test proves all the potassium chloride was removed. Explain why a dry reading alone cannot establish this. [1]

Answer and work